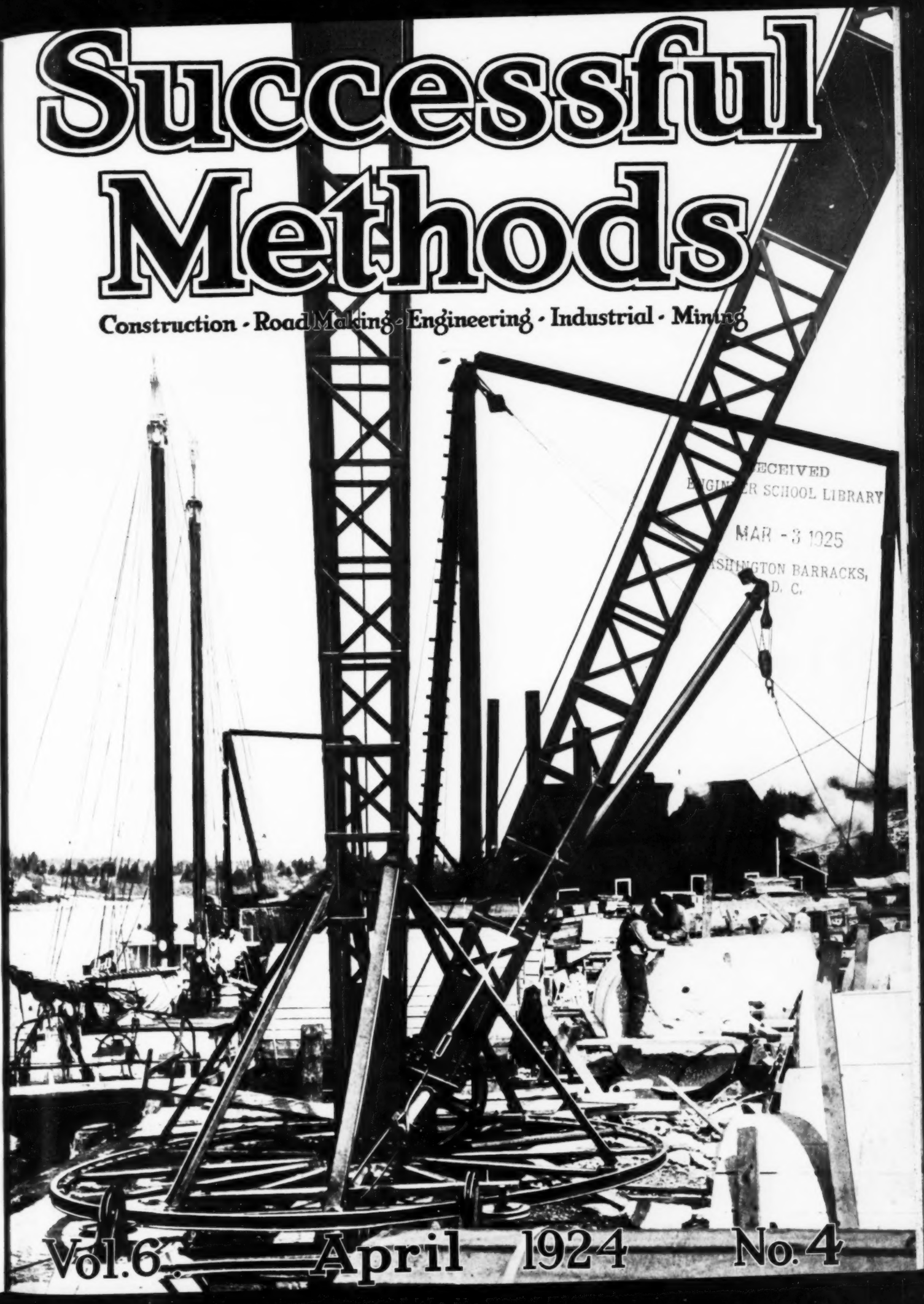
Successful Methods

Construction - Road Making - Engineering - Industrial - Mining



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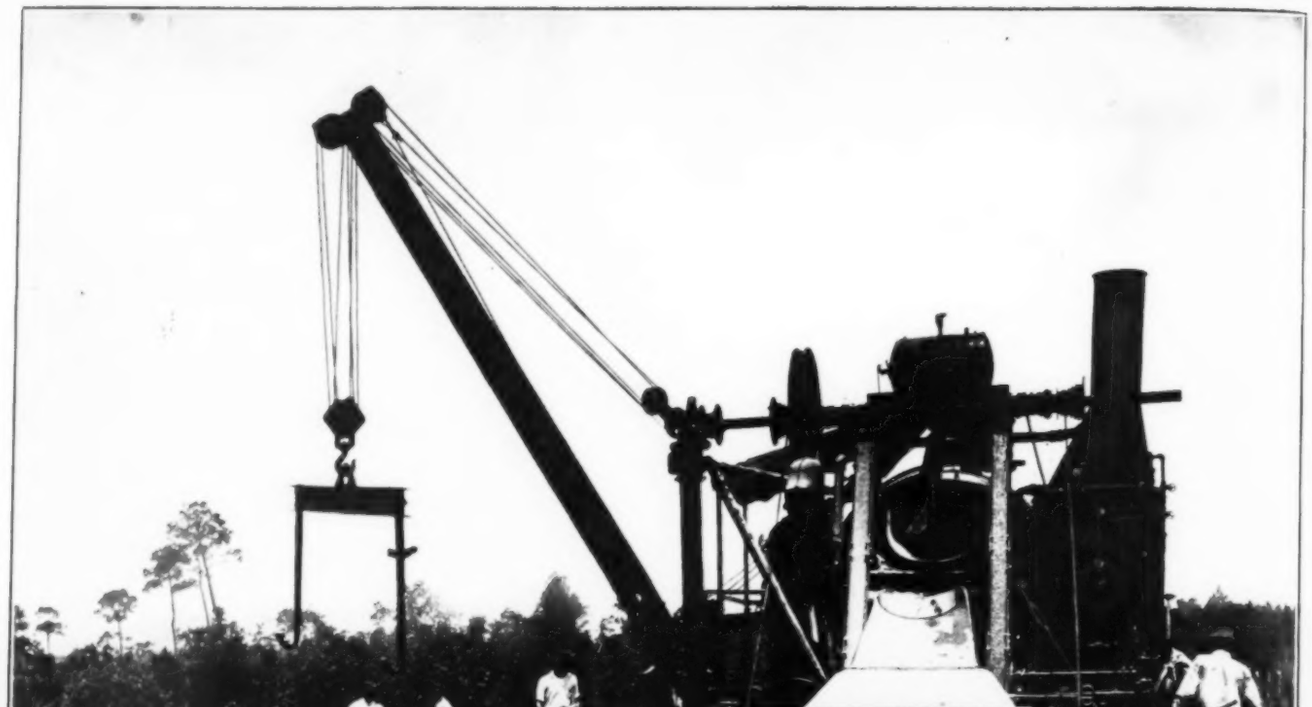

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Successful Methods

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Plenty of Open Top Cars

FOR the first time in years it seems fairly certain that there will be plenty of open top cars for handling construction materials this season. Those who have suffered such serious losses in recent years from car shortages will have to be shown. They have seen a lot of promises go bad. They have decided from dearly bought experience not to count on current deliveries keeping the job going. Even with the improved outlook for cars this season, generous stock piles will, of course, permit everybody to rest easier. But an ample supply of open top cars appears certain, except probably in a few localities there may be a shortage now and then for short periods.

Many causes have contributed to the existing surplus of open top cars. The slack demand for coal in the last couple of months has released a great quantity. Quicker loading and unloading also have helped a lot. But the biggest factor has been the greatly increased efficiency in handling traffic of all kinds by the railroads. Few appreciate the wonderful records that the railroads of this country have made during the last year and a half in handling the heaviest traffic ever known. They have proved beyond a doubt that private ownership can do the job if impractical politicians give private management a fair chance.

A "Shirt Sleeve" Road Show

THE American Road Builders' Association has announced that it will conduct an outdoor working demonstration of roadbuilding methods and equipment in the vicinity of Greensboro, N. C., June 4-7. The Pan-American Highway Commission will be on a trip of inspection over many of the North Carolina highways at that time. Frank Page, Chairman of the North Carolina State Highway Commission, has arranged a trip of unusual opportunity for the group of forty distinguished engineers and business men from the republics to the south of us who will make up the Pan-American Highway Commission. He felt that it would be very fitting also to stage at one central point a working demonstration of roadbuilding methods and equipment on a large scale. The American Road Builders' Association has accepted his invitation to lend its aid by sponsoring the plans.

All types of machinery and equipment used in building and maintaining roads will be shown in actual operation. An opportunity will be given to see just "what will it do on a regular job?" To this end many manufacturers are arranging to put in service at the central location some of their equipment which is in regular use on jobs near the grounds where the working demonstrations will be made.

Invitations to attend are being extended to all who are directly interested in road building. Officials of the southeastern states are taking a keen interest in the plans for the show. The state highway departments of these states expect to be fully represented. It also is expected that a large number of contractors and county and city officials will grasp the opportunity to see how it is done. All of these road builders will likewise help to show the distinguished visitors the South's appreciation.

The American Road Builders' Association is making a special effort to acquaint road builders from all other countries with this very unusual opportunity to see American methods of constructing and building roads. Many engineers from abroad have come here in recent years to study our highway affairs. It is hoped that all those who plan to come this year can arrive in time to take advantage of the opportunity that the North Carolina working demonstration will offer. They should be able to see there in a few days, under good conditions, more than they could cover in weeks of an ordinary inspection trip.

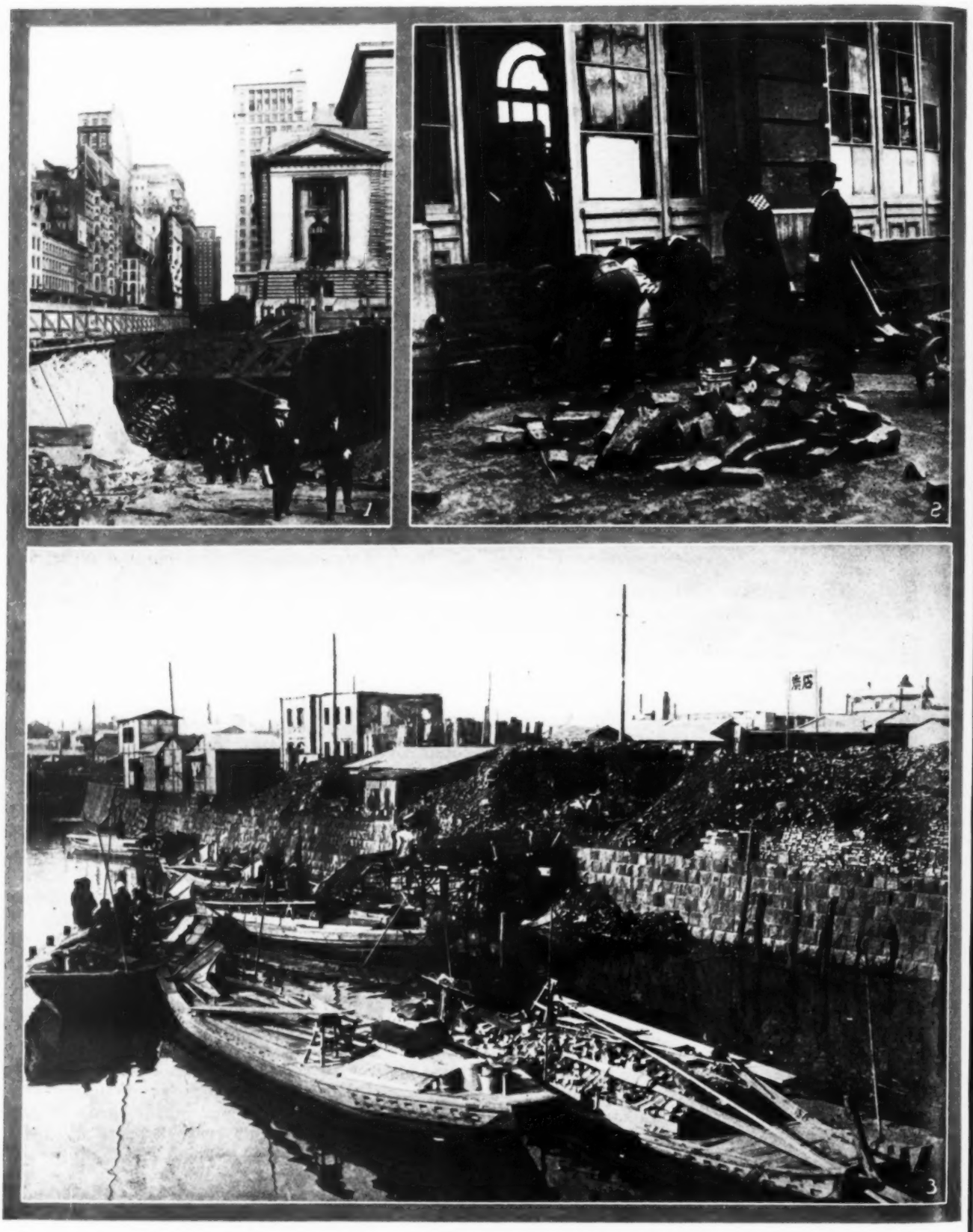
A Cold Job Well Done

ORDINARILY the articles in SUCCESSFUL METHODS describe construction jobs which have just been completed or which are still under way. In a measure the article in this issue describing the quarrying of granite for the new courthouse in New York City, fulfills both these requirements as the last of the stone was delivered within a month, and the courthouse itself is still under construction. The real romance of the article, however, took place a full year ago in the winter of 1922-23, and most of the article describes the remarkable work done at that time. It was so remarkable that although the story is a year old, it is too good to leave untold.

The coast of Maine is cold enough in an ordinary winter, but this job was carried through on schedule time during the most severe winter in the memory of the oldest inhabitant.

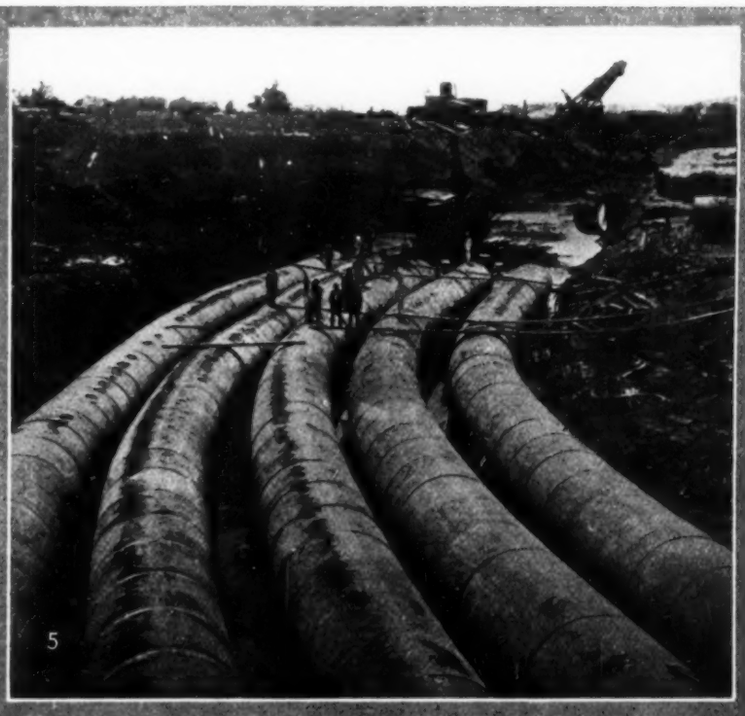
A real contractor never knows where his work will take him. He must be so equipped that he can handle a job in the tropics or as far North as the necessity of the occasion requires.

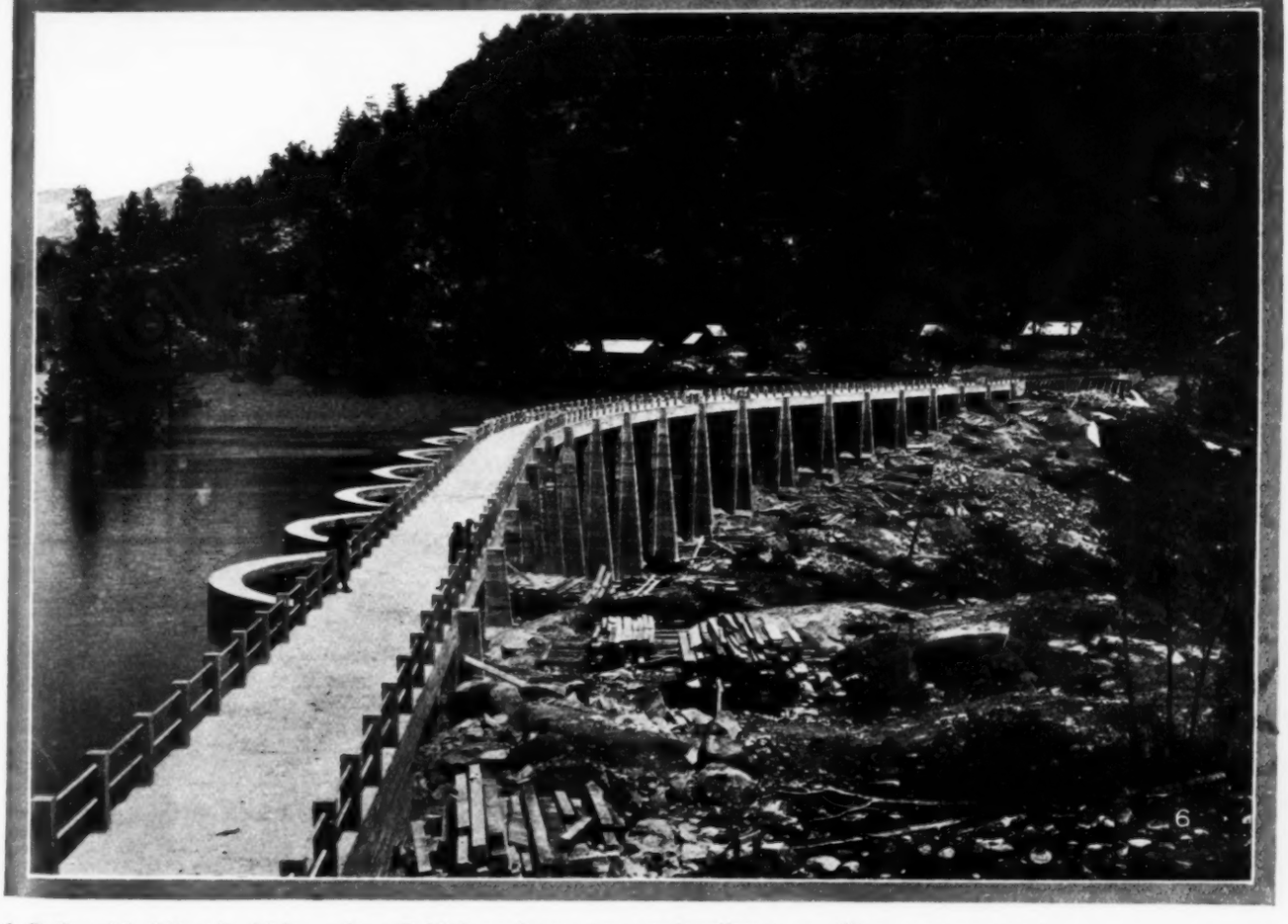
The Construction Field



1. One more subway for New York City. This one cuts under the north side of the Public Library. © *P & A Photos.*
2. A little emergency construction work made necessary by the flooding of the Paris streets. These workmen are building a brick wall to keep the Seine from invading the Invalides railroad station. © *P & A Photos.*
3. Getting rid of the debris left by the great earthquake in Tokio. The waste material is loaded on boats and taken out to sea. © *P & A Photos.*

Has No Boundaries





4. Railroad building in Africa, where British engineers are constructing a new line. © *International.*
5. A big irrigation project in Mexico. These immense pipes are being built to convey the water to the now arid lands near Culiacan. © *P & A Photos.*
6. One of the units of the Hetch Hetchy development which will supply San Francisco with water. This is the Eleanor Dam. © *International.*

A REAL CONTRACTOR CAN'T BE LICKED

A Maine Winter At Its Worst Delayed the G. A. Fuller Co. Just One Day in Getting Out 205,000 Cubic Feet of Granite for New York's New Court House

IN full view of the thousands who pass it every day, New York's new courthouse is rapidly nearing completion. The progress of the construction

COLUMN DRUMS READY FOR SHIPMENT TO NEW YORK

work for the last year has been watched daily by the usual throngs that gather wherever a big construction job is under way in the midst of a great city. What no one in New York City has seen, however, is the splendid job that had been done before the courthouse could be built. The building contains 205,000 cu. ft. of granite and this immense volume of stone was quarried in the short space of 14 months at Deer Isle, Maine.

As most of the readers of SUCCESSFUL METHODS know, the Maine coast in the winter is not a very comfortable place in which to carry on any sort of work, and as the winter of 1922-23 happened to be the severest in the memory of even the oldest inhabitant, it requires no great imagination to realize that it was no easy job to produce the courthouse granite on schedule time.

ONLY THE DIFFICULTIES OF TRANSPORTATION LIMITED THE SIZE OF THE BLOCKS

The contract for the courthouse was signed on June 30, 1922, the George A. Fuller Company of New York City, getting the work. It was decided that the

BLASTING A CHANNEL WITH DYNAMITE. THE ICE WAS FROM 16 TO 22 INCHES IN THICKNESS

THE CUTTING YARD IN MIDWINTER. THE LIGHTS USED FOR THE NIGHT SHIFT MAY BE SEEN ABOVE.

best way to eliminate the usual delays in obtaining the stone for so big a job would be to keep this branch of the work in the hands of the general contractor. Therefore, the George A. Fuller Company leased the quarries at Hallowell and Stonington, Me., and on July 15, 1922, only two or three weeks after the signing of the contract, the actual work began. In the meantime the equipment necessary for cutting the stone had been purchased, and it was installed at the quarries as fast as the manufacturers could deliver it. The installation of this machinery was necessary as the courthouse requirements called for a great variety of shapes. For example, there were 320 column drums and pilasters requiring 7 miles of fluting. One of the first jobs done at the quarry was the fabrication of 40 fluted pilasters with Corinthian caps.

THE DOME SECTION FITTED TOGETHER AT THE QUARRY

About 500 men were put to work at the quarries and in November, 1922, night and day shifts went on the job. Then came the unexpectedly severe winter which threatened to upset all calculations. During the winter the total snowfall was 12 ft., and ice 20 in. thick cut off the island. J. F. Manning, General Manager in charge of the quarries for the George A. Fuller Company, found himself with a

SIXTEEN OF THESE BASES FOR COLUMNS WERE TURNED AT STONINGTON

THE PLEASANT SIDE OF THE BIG JOB. EMPLOYEES LANDING FOR THE FOURTH OF JULY PICNIC

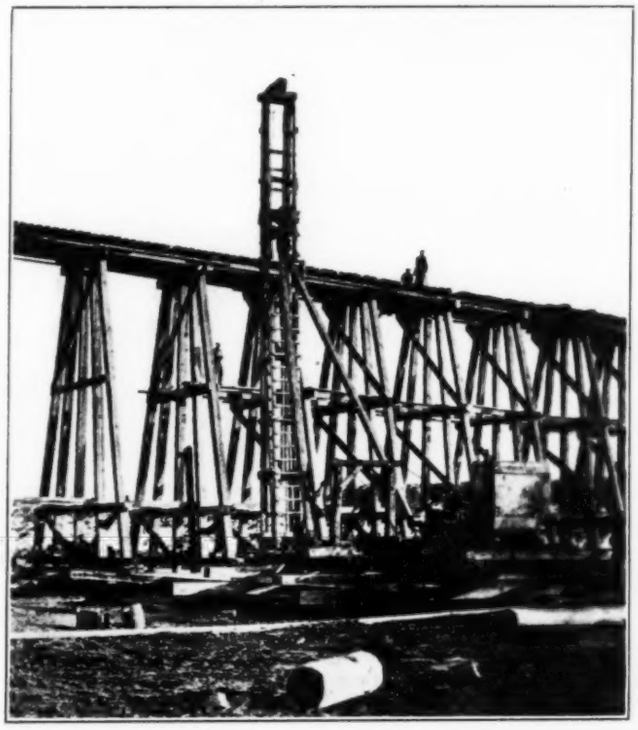
real problem on his hands. The amount of supplies that had been laid in to maintain the organization during the winter had been based on the statements of the inhabitants of the region in regard to the length of time navigation ordinarily was closed. It was soon evidenced that these supplies were not sufficient as Penobscot Bay was frozen to the outer islands from January to March. Schools in the region around the Bay were closed, because of the lack of fuel and some of the towns ran out of food. In spite of all this, work at the quarries went on steadily night and day, and the final record shows the astonishing total of only 24 hours lost, because of inclement weather. In order to get food and fuel to the quarries it was necessary to blast channels with dynamite, and five times during the winter a 5-mile channel was blown through the ice to open up a passageway for the schooners loaded with coal, and for the barges in which the finished material was carried to New York. Valuable assistance in this work was rendered by the vessels of the government lighthouse and revenue service. Several times they broke channels for the passage of boats.

The photograph on the cover of this issue of SUCCESSFUL METHODS shows the wharf at Stonington, with some of the big columns ready for loading. The photographs accompanying this article show other phases of the work. Some were taken during the winter when work was carried on under so great a handicap, and others during the summer when things went along a great deal more pleasantly. All of the 205,000 cu. ft. of granite is now in place and in its May issue SUCCESSFUL METHODS will print an article describing the construction of the courthouse.

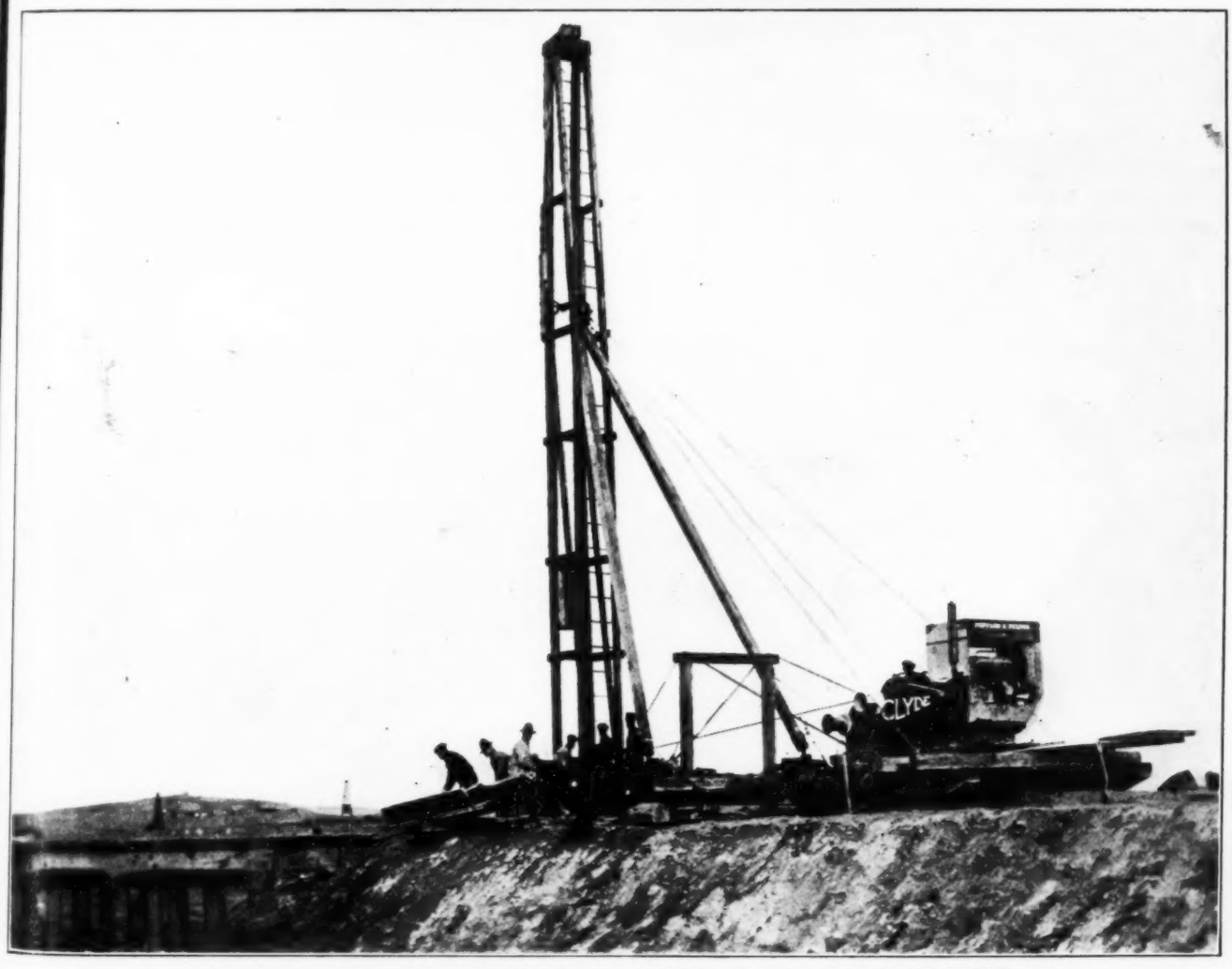
GASOLINE HOISTS FOR PILE DRIVING

THE use of gasoline operated machinery in construction work is constantly increasing and the two photographs on this page show how Peppard & Fulton of Superior, Wis., who are engaged on bridge work for the Wyoming North & South Railroad in the Salt Creek oil fields are using 50 hp. gasoline hoists for pile driving.

These two hoists have driven about 125,000 lin. ft. of pile in the last few months. The engines had to lift a 3200-lb. hammer with a 1200-lb. follower and averaged 14 blows per minute with a gasoline consumption of 11 gal. per 10-hr. day. In the Salt Creek oil fields water is hard to obtain, as it has to be hauled by truck and team about 50 miles. Coal also is scarce, so that in the opinion of Peppard & Fulton the use of the gasoline hoists effected a saving of 40 per cent in the cost of the pile driving.

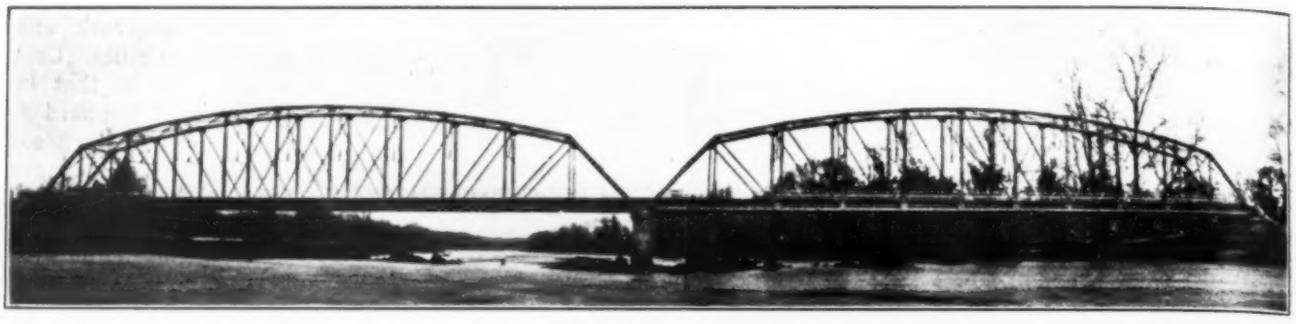


L. B. Fulton of the firm of Peppard & Fulton says: "It was simply a case—from a fuel standpoint—of putting a 12-gal. jug of gasoline in the automobile, which was amply sufficient for the day's operations, driving to the site of the work, pouring the gasoline in the tank and cranking the engine for the day's run." That tells the whole story in one short sentence.



GASOLINE OPERATED PILE DRIVER AT WORK IN SALT CREEK OIL FIELD

BUILDING A BRIDGE ON SHIFTING SANDS

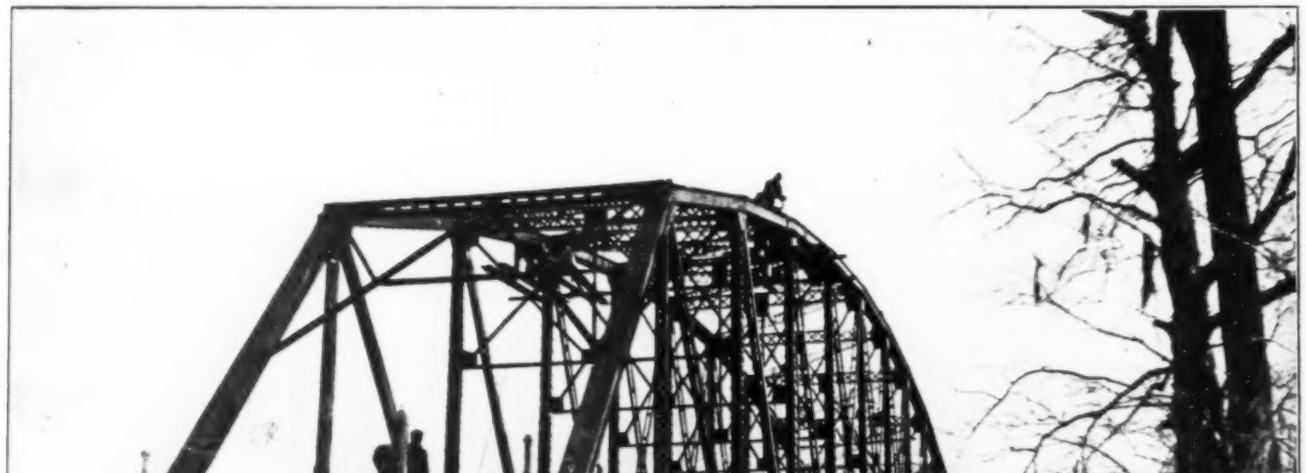


Louisiana Highway Commission Designs Structure to Withstand Unfavorable Conditions in Bed of Stream

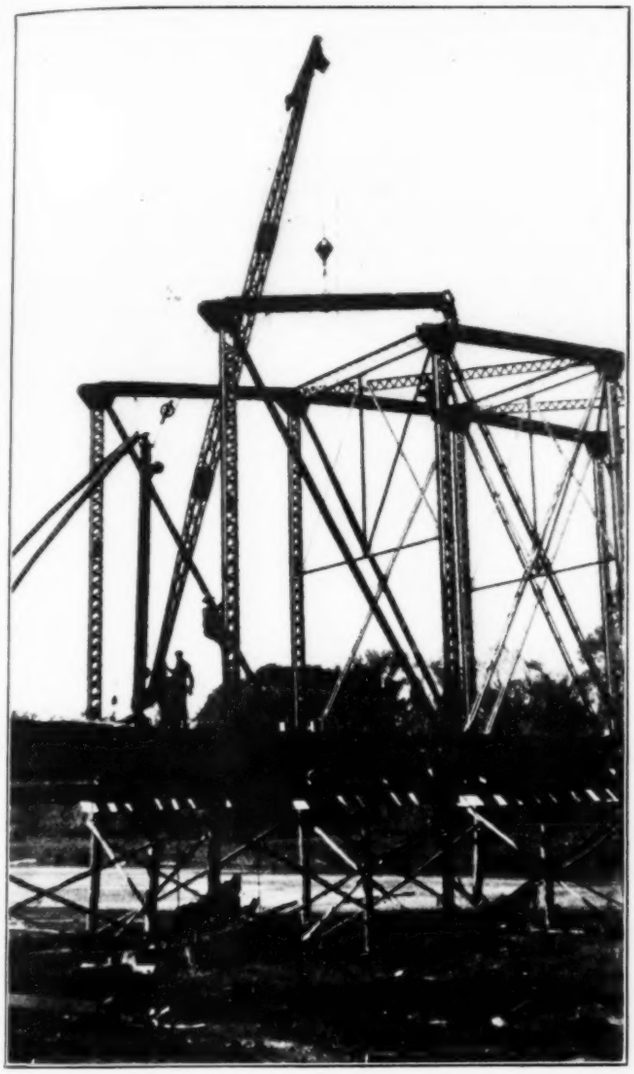
By N. E. Lant
Bridge Engineer, Louisiana Highway Commission

A HIGHWAY bridge has just been completed over Thompson Creek on the Mississippi Scenic Highway, between Baton Rouge and St. Francisville, Louisiana. The structure is composed of twin spans, each 225 ft. long, and resting on reinforced concrete abutments and center pier. All footings are carried on untreated timber foundation piling.

For many years a highway bridge over Thompson Creek is this vicinity has been needed, because of the fact that it is on the route of one of the main interstate highways between Louisiana and Mississippi, and the only other bridge locations where all weather crossings are economically possible are so far to the north and east that by using any one of these the distance from Baton Rouge to St. Francisville would be increased by one-half. East and West Feliciana Parishes, which lie on the east and west side of Thompson Creek, respectively, have studied the situation for many years, but on account of the unfavorable conditions present, which would necessitate an expensive type of structure, had never made up their minds to put the project under construction. The unusually unfavorable conditions present are the deep layers of shifting sands in the stream bed extending from 30 to 40 ft. below low water elevation, and practically the same depth below stream bed. This sand is commonly known as quicksand, and although there is only a small amount of water in the stream at low water, it has never been safe to ford it. The drainage basin of Thompson Creek is such



RIVETING TOP CHORD CONNECTIONS ON THE WEST SPAN OF BRIDGE



ERECTING STEEL ON EAST SPAN

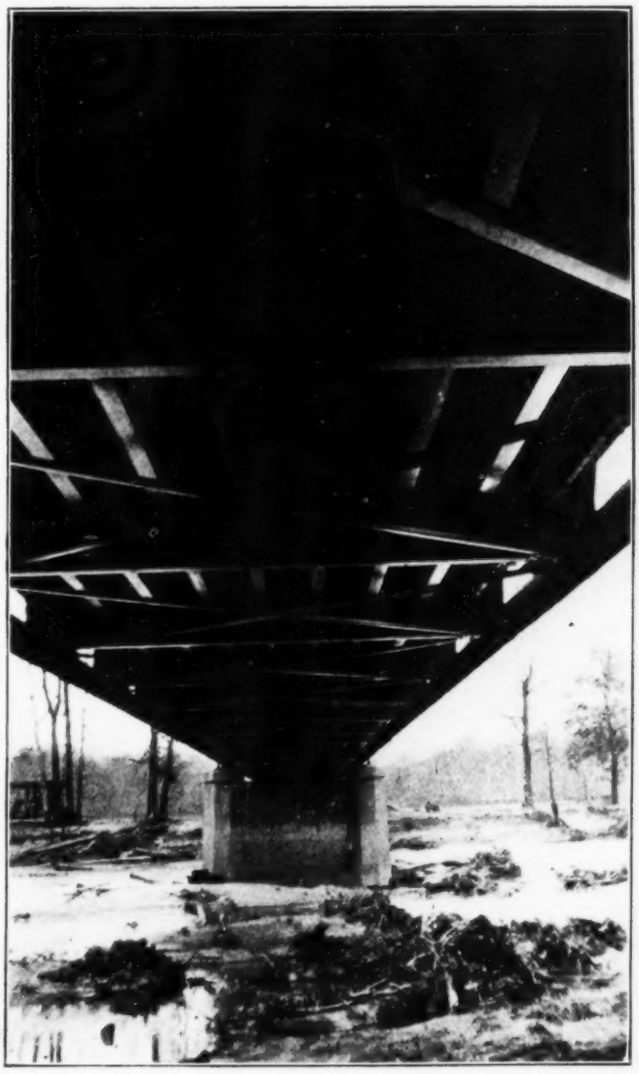
that a quick runoff is obtained, as the basin has comparatively steep slopes and is comparatively short in direction of flow, considering the large area drained. These conditions cause unusual rises in the creek and high velocities of current, as much as 20 ft. rises over night having been recorded, and the high velocities cause the sand layers in the stream bed to move down stream "en masse."

At the site selected for the bridge, the natural banks are well defined and are approximately 400 ft. apart and approximately 8 ft. high. Maximum high water elevation is approximately 6 ft. above top of natural banks and the stream overflows the natural channel on an average of three times a year. The structure was planned as a twin span bridge of two 225 ft. spans on reinforced concrete piers and abutments with pile footings.

Unusual construction was used on the foundations for the center pier where borings showed 25 ft. of fine sand, then about 2 ft. of gravel, followed by 10 ft. of coarser sand and then clay. The pier was designed as a dumb-bell section with solid web extending 2 ft. below water elevation and supported on two separate footings. Each footing was a steel sheet pile cofferdam 9 ft. square with each side driven at an angle of 45 deg. with axis of pier, in order to have the nose upstream and offer the minimum of resistance to moving sand.

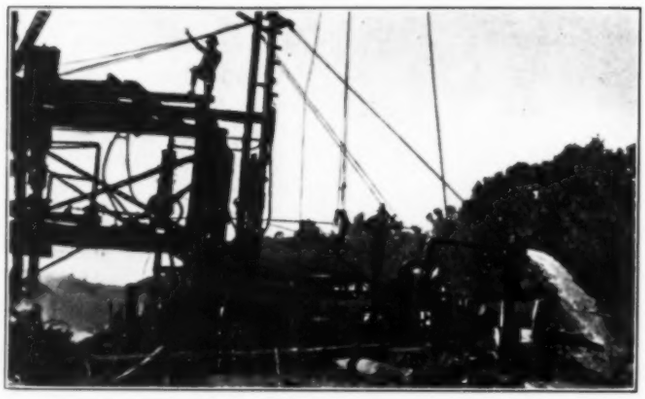
Steel sheet piling 30 ft. long was used for each cofferdam, and it was necessary to use steam hammer and water jets to sink it. Driving continued around the cofferdam until the points of the sheet piling were in gravel which was partially cemented. The cofferdams were then unwatered, sand pumped out down to level of gravel and then allowed to fill up with water again as there was considerable danger of the bottom blowing out. Nine 30 ft. timber foundation piles were then driven in the bottom of each footing by using follower and cutting piling to exact length required before driving, as determined by first two piles driven. These foundation piling were allowed to extend 5 ft. above bottom of the steel sheet piling, and after all were driven the steel sheet pile cofferdam was filled with concrete and deposited under water by using tremie. The pier stem was then built upon the top of the two footings and anchored to each one with 8 1-in. sq. reinforcing bars.

It was necessary to use water jets in addition to



UNDER THE BRIDGE FROM EAST ABUTMENT

the hammer on all foundation and false work piling, but no difficulties were encountered in erecting the steel, because no unusual high stages of water were experienced during the time the steel was being erected, namely, from November, 1923, to January, 1924. The engineers in charge of the work considered themselves very lucky to escape trouble on this point. The danger of a sudden rise in the stream is always a bugbear on a job of this sort.



PUMPING OUT UPSTREAM FOOTING OF COFFERDAM

This bridge is one of several on the present construction program of the Louisiana Highway Commission. The fact that Louisiana is honeycombed with rivers, bayous and other water courses makes the bridge problem a big one and naturally increases the cost of highway improvement.

The work was planned and supervised by the Louisiana Highway Commission, W. T. Peterman, Chairman, J. M. Fourmy, State Highway Engineer and N. E. Lant, Bridge Engineer.

COOPERATING WITH THE PUBLIC

IN his instructions to his field forces, John D. Williams, State Highway Director of Indiana, includes this admonition:

"While we must do our work on the highways it is necessary that we inconvenience the users of the highways just as little as possible. You must give a traveler the right-of-way. You must consider yourself as exercising a kind of a fatherly protection over the traveling public and respect their rights in every reasonable way as the roads are for their use. A truck driver who refuses to permit an auto coming up from the rear, to go by him, commits an offense against the law as well as one against the rules of the department, and is subject to prompt dismissal."

OLD TIRES USED FOR PAVEMENT

Experimental Surface in Bradford, England, Constructed of Waste Rubber

A NOVEL rubber road surfacing made from discarded tires from motor trucks is being tried in the City of Bradford, England, as an experiment. The rubber is stripped from the metal rims of solid tires after they have been discarded by truck owners, and the rubber is then cut into pieces about 11 in. long by 2½ in. square. Several methods of laying the blocks are being tried, notably in the herringbone style, concentric circles and in wavy lines running across the road, and diagonally.

The blocks are set upon a concrete foundation and fixed with tar, any projections being cut off with an adze in the first instance and then smoothed down by means of hot iron blocks being rubbed over them.

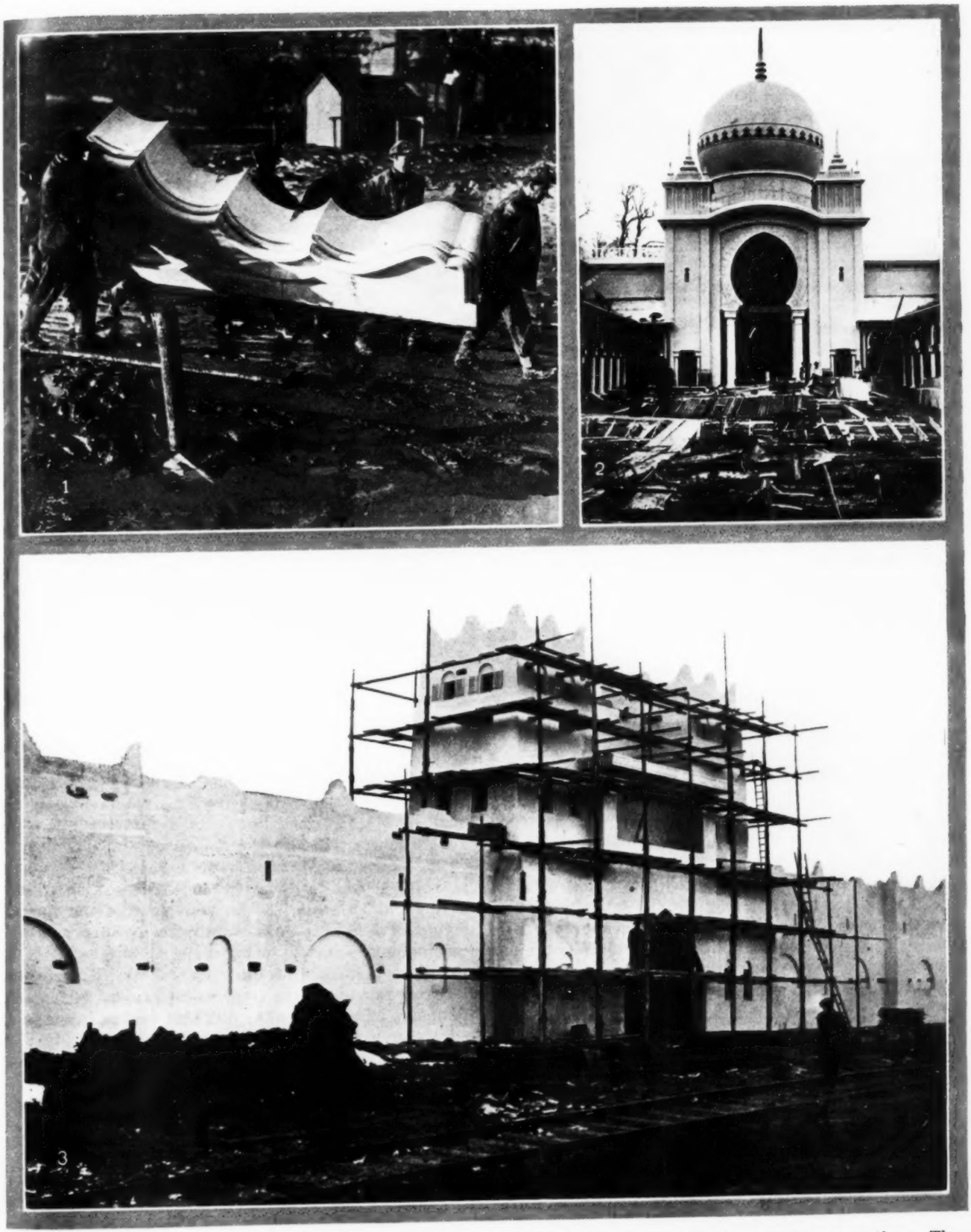
THE LATEST IN RUBBER ROADS

The finished surface has every appearance of being satisfactory under actual traffic conditions, and there is every indication that it will wear well, while traffic noises are almost non-existent.

It is estimated that the cost of laying the road is about fifteen shillings per square yard, or approximating between three and four dollars, which is considerably less than the cost of any other rubber surface put down in Europe. The rims of the tires after the rubber is stripped find a market at almost the price given for the wornout tires.

Whether or not this pavement will prove successful only time can tell. In any case, it is an interesting experiment and if it does prove a success will provide an outlet for old tires.

The British Empire Comes to London



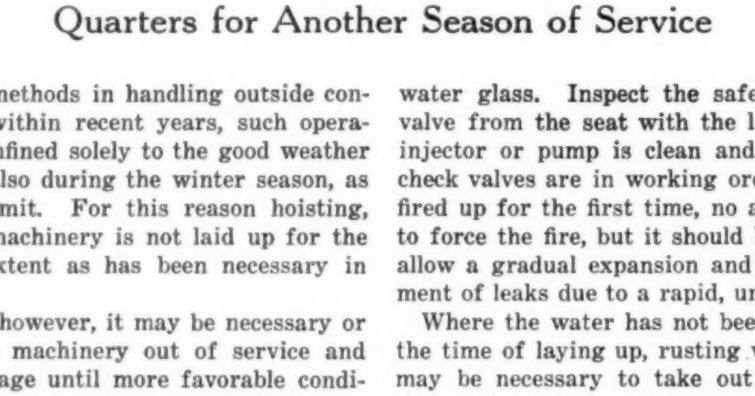
1. If this chunk were made of the stone it is meant to resemble these workmen would not have such an easy time. They are engaged in the construction of the building for the British Empire exhibition to be held at Wembley, England.
2. The Indian temple which will be one of the features of the exhibition.
3. The East African exhibit will be housed in this building. © P & A Photos.

THE SPRING CLEAN-UP

Thorough Inspection and Lubrication Necessary Before Machines Leave Winter Quarters for Another Season of Service

DUE to improved methods in handling outside construction work within recent years, such operations are no longer confined solely to the good weather months, but progress also during the winter season, as long as conditions permit. For this reason hoisting, excavating, and road machinery is not laid up for the winter to the same extent as has been necessary in former years.

In certain instances, however, it may be necessary or desirable to take such machinery out of service and place it in winter storage until more favorable conditions warrant proceeding with the work or starting a new job. Such periods of idleness are not favorable to preserving the proper mechanical condition of the equipment and cases often arise where the rusting, gumming and corrosion of the parts have made it necessary to overhaul the outfit before it can be put to work after a long period of idleness.



GOING OVER A CONCRETE MIXER BEFORE STARTING THE SEASON

Proper care, on the other hand, at the time when the machine is laid up, will not only prevent this rusting and corrosion, but will decrease the time of labor required to overhaul it in the spring and will assure the immediate availability of the equipment on short notice. When this class of machinery has received intelligent care at the time of lay-up, very little attention is required again in the spring, other than thorough cleaning and lubrication. The life and efficiency of the machinery is also affected by the care it receives during the time it is laid up.

In the case of steam equipment when proper care has not been taken in the fall, and where the boiler has been left outside exposed to the weather, a thorough inspection of all the seams and joints will be necessary before starting up. If the exposure to the weather has opened up any seams or joints they must be carefully calked. Before placing the boiler in service, it should be inspected also for corrosion and possible weakness in the metal under strain. Defective tubes should be replaced.

After the boiler is thoroughly overhauled it should be completely flushed out, placed in position and given a hydrostatic test in the presence of the inspector. It is always advisable when reconditioning the boiler to inspect and renew the fusible plug, to test the pressure gage, to try the gage cocks and the drain cocks in the water glass. Inspect the safety valve by lifting the valve from the seat with the lever. See also that the injector or pump is clean and that the feed line and check valves are in working order. When the boiler is fired up for the first time, no attempts should be made to force the fire, but it should be brought up slowly to allow a gradual expansion and to prevent the development of leaks due to a rapid, unequal expansion.

Where the water has not been drained thoroughly at the time of laying up, rusting will usually occur and it may be necessary to take out the piston, thoroughly clean the cylinder walls, piston rings and piston rod with kerosene in order too remove the rust. These surfaces should then be wiped dry and thoroughly lubricated with cylinder oil before starting up. The piston rod gland and valve rod stuffing box should be repacked, as the old packing has probably hardened and become worthless.

All engine parts should have been thoroughly slushed with a good coat of cylinder oil at the time the engine was laid up. This should be done after first cleaning the parts from water and dirt. If this has not been done, the rust and muck may be removed in the spring with a good dose of kerosene and elbow grease. These parts should then be thoroughly lubricated with the engine oil.

The crosshead, crosshead pin, crank pin and main bearings should be inspected and taken up if necessary in the fall. If this has not been done at the time of lay-up it should be done before the machinery is sent out to the job in the spring.

Before placing a steam outfit in service, it is well to let it run idle for a time on compressed air instead of steam. This allows any dirt that may be in the pressure system to work its way out, whereas if steam is used this dirt would form a muck with the condensed steam and would probably stay in the cylinder, valves or ports.

All bearings on this class of machinery should be inspected and cleaned, after which they should be thoroughly lubricated with the proper oil. Care should be taken that all grit and dirt is removed during the cleaning.

Unless they have been properly cared for and lubricated at the time the machine is laid up the large gears

will probably rust up considerably while idle, especially if the machine is lying out in the weather. These gears should be protected under such conditions with the proper adhesive and non-corrosive gear lubricant. The lubricant used must be one that will not wash off.

Where this care has not been taken, or where the protecting lubricant has not been the proper one and has been unable to resist the washing effect of the weather, considerable rusting may develop. The gears must then be thoroughly cleaned with kerosene. It is necessary to remove all grit, dirt and rust on the gear teeth before putting on the fresh coat of lubricant, otherwise it will not "stay put." For this severe service, a very heavy, tacky lubricant is desirable—one which will cling to the tooth surfaces, absorb shock and prevent wear, without being thrown off when the gears are running or dripping off when they are idle. The best lubricant is one that will have very little fluidity at normal temperatures, but which can be easily applied after slightly heating and which will return again to its original consistency after cooling, forming an effective and pliable coating on the tooth surfaces.

PUTTING THE LAST TOUCHES ON A SMALL MIXER BEFORE IT GOES OUT OF YARD IN INDIA

The wire rope used on hoisting and excavating equipment requires careful attention and lubrication for the sake of safety and for preserving the life of the cable. This cable has unusually severe service because it is always exposed to grit and dirt and because of the very short sharp bends required in running over the small sheaves. Unless this cable is properly protected when the machine is laid up it will undoubtedly rust and corrode during idleness.

Before starting up in the spring, therefore, the cable should be carefully inspected for weakness and should be thoroughly lubricated with a lubricant similar to that used for the large open gears. This lubricant can be easily applied if slightly heated by pouring it into the groove of the sheave when the machine is running slow. It is absolutely essential that the cable be thoroughly cleaned and all dirt and muck first removed. A thorough application of the right lubricant before placing the cable in service again will assure longer life and greater safety for the cable.

When a gasoline outfit is laid up, the oiling system should be drained and thoroughly flushed. Check valves should be removed, thoroughly cleaned and placed where they will not be damaged and where they will be readily found again in the spring. After the oiling system has been flushed and cleaned, the crank case should again be filled with oil. It is always advisable to turn the engine over a dozen times or so every six weeks while it is laid up. This renews the oil film on the lubricating parts and prevents rusting.

Where this has been done all that will be necessary in the spring is to drain out the old oil and replace it with a fresh supply, replacing also any check valves and other appliances that have been removed.

If proper attention has not been given, however, the checks should be carefully inspected to see that they are in good order, and the oiling system should be blown out to see that it is free from muck. The entire system should be thoroughly flushed with lubricating oil. Care should be taken not to use kerosene, as this will dilute the oil in the crankcase. The engine can then be filled with the proper oil and allowed to run idle for a time before being sent out to the job.

The most important thing to bear in mind in getting ready contractors' machinery for spring work after it has been laid up for the winter is that the parts must be thoroughly cleaned. Rust and dirt must be removed with kerosene and the entire equipment must be thoroughly lubricated with the right oil previous to starting up. It is always advisable to let the engine run idle for a short time and to try out each part of the equipment slowly without attempting to do any work with it until it is certain that everything is working smoothly and all adjustments have been properly made. The importance of starting with the right oil and continuing its use during the service with the equipment cannot be over emphasized, since the correct lubrication of this equipment will increase its efficiency, prolong its life, decrease the maintenance cost and promote the safety of this kind of work.

Now is the time to get out every piece of machinery that is to be used during the construction season which is just beginning in order to make sure that it is ready to do its work. As has been said, the machine that was properly taken care of in the fall will need comparatively little attention now. Nevertheless, no matter how good a job was done in laying it up for the winter, it should be inspected with the utmost care before it leaves the storage yard and after it gets on the job, it should be looked over periodically and not allowed to deteriorate simply for want of proper lubrication and attention. No matter how rugged a piece of machinery may be, it always needs proper handling.

The time spent in looking it over thoroughly in the spring will not be wasted in any sense of the phrase. Unceasing vigilance is the only real safeguard.

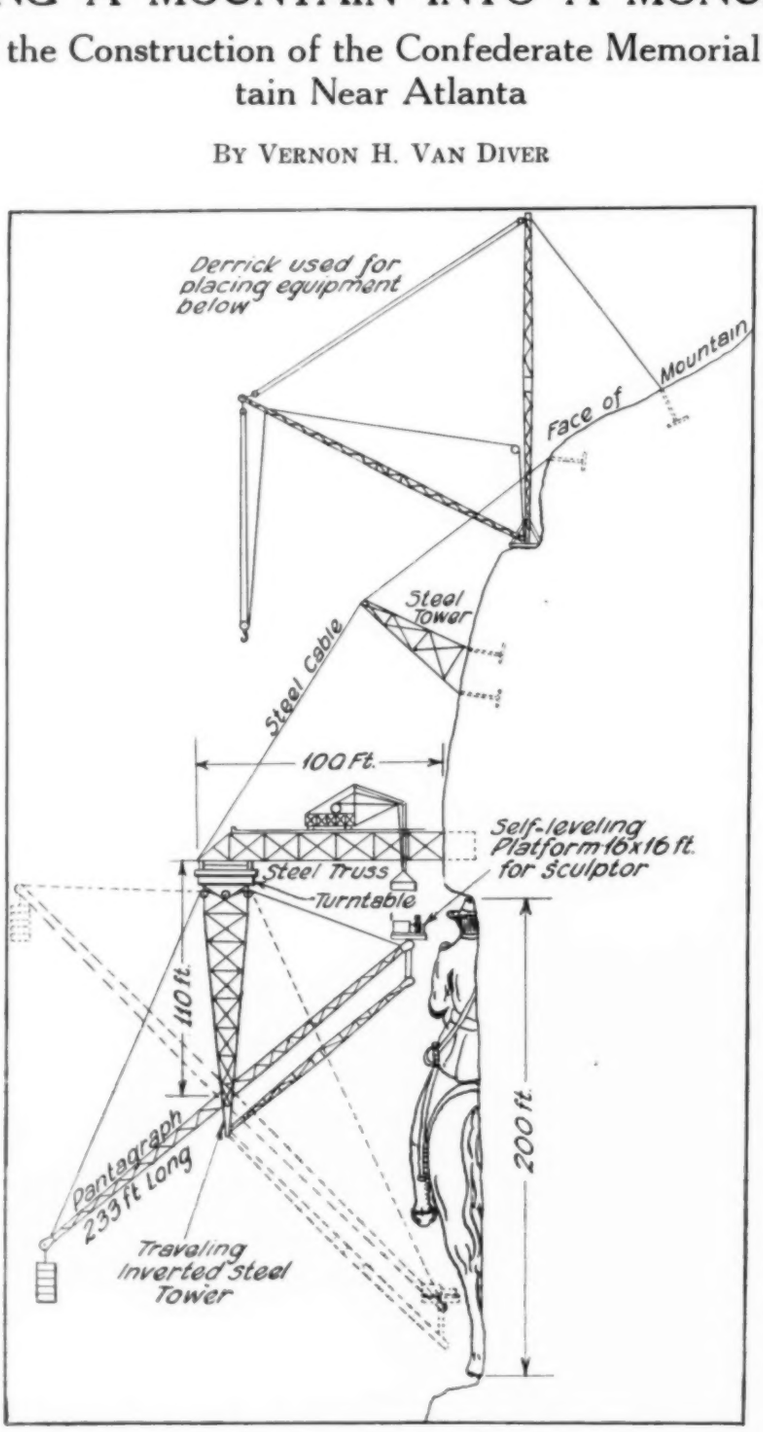
MAKING A MOUNTAIN INTO A MONUMENT

Some Details of the Construction of the Confederate Memorial on Stone Mountain Near Atlanta

By Vernon H. Van Diver

WHEN Gutzon Borglum conceived the idea of carving the great Confederate Memorial on the face of Stone Mountain, near Atlanta, Ga., and presented his plan to the public, the consensus of opinion was that it could not be done. However, with his genuine enthusiasm and his natural ability as a public speaker, he convinced the public that it could be done, and the fact that Jan. 19, 1924, witnessed the unveiling of a completed portion of the work is evidence that he is doing it.

Such a mammoth work of art naturally presents many serious difficulties. The first, that of devising some means of getting an outline on the face of the precipice, would have daunted a less courageous man. But, after experimenting with and discarding numerous schemes Mr. Borglum sought outside aid in the person of Edwin Porter, who developed a projecting machine capable of throwing a picture a distance of from 700 to 1000 ft. A photograph of the clay model of the central group, fashioned by Mr. Borglum in his studio in Stamford, Conn., was then made, and from this an outline was reproduced on a plate measuring only 2 x 2½ in. This outline, when projected on the face of the precipice, covered an area 200 ft. high by 250 ft. long. Ordinary workmen, suspended over the cliff at night, painted the outline. Seen from the ground, this outline looks like chalk marks, but in reality every line is 12 in. in width.



HOW THE DIFFICULT JOB WILL BE MANAGED

With the outline painted, Mr. Borglum was ready to begin the actual carving of the panorama. On Virginia Day, June 18, 1923, with ceremonies befitting the historic and sacred occasion, Mr. Borglum was lowered over the cliff by means of a steel cable and, with a compressed air drill, began a work that will require six or seven years to complete. While it would be possible to execute the plan by suspending men by a series of steel cables from an anchorage on top of Stone Mountain, it would prolong the work beyond the sculptor's lifetime. Hoisting machinery of unique design and exceptional dimensions has, therefore, been developed to expedite operations.

Before the fine carving can be done on the panorama, it will be necessary to channel the outline of each figure and to remove the superfluous granite. This will entail many miles of channeling and the disposal of hundreds of thousands of cubic feet of granite. With the cooperation of prominent compressed air machinery manufacturers, Mr. Borglum hopes to reduce this work to an exact science.

This stupendous graven page of history will begin on the right near the mountain's summit, and upon it, sweeping downward and across it a distance of 1100 ft., there will be carved a succession of groups representing the Confederate armies marching into battle. On the right will be artillery, the horses straining in their breeching to hold back the gun

carriages. Next will be cavalry in full swing. In the center is being cut a magnificent group of Confederate chieftains. On the left of this group and extending off toward the end of the mountain will be advancing Confederate infantry. The figures in the central group will be nearly 200 ft. high, as high or higher than a 17-story office building. All other figures in this monumental work will be in relative proportion and in full relief. The impression upon the beholder will be that of standing back of the central group and reviewing a passing army.

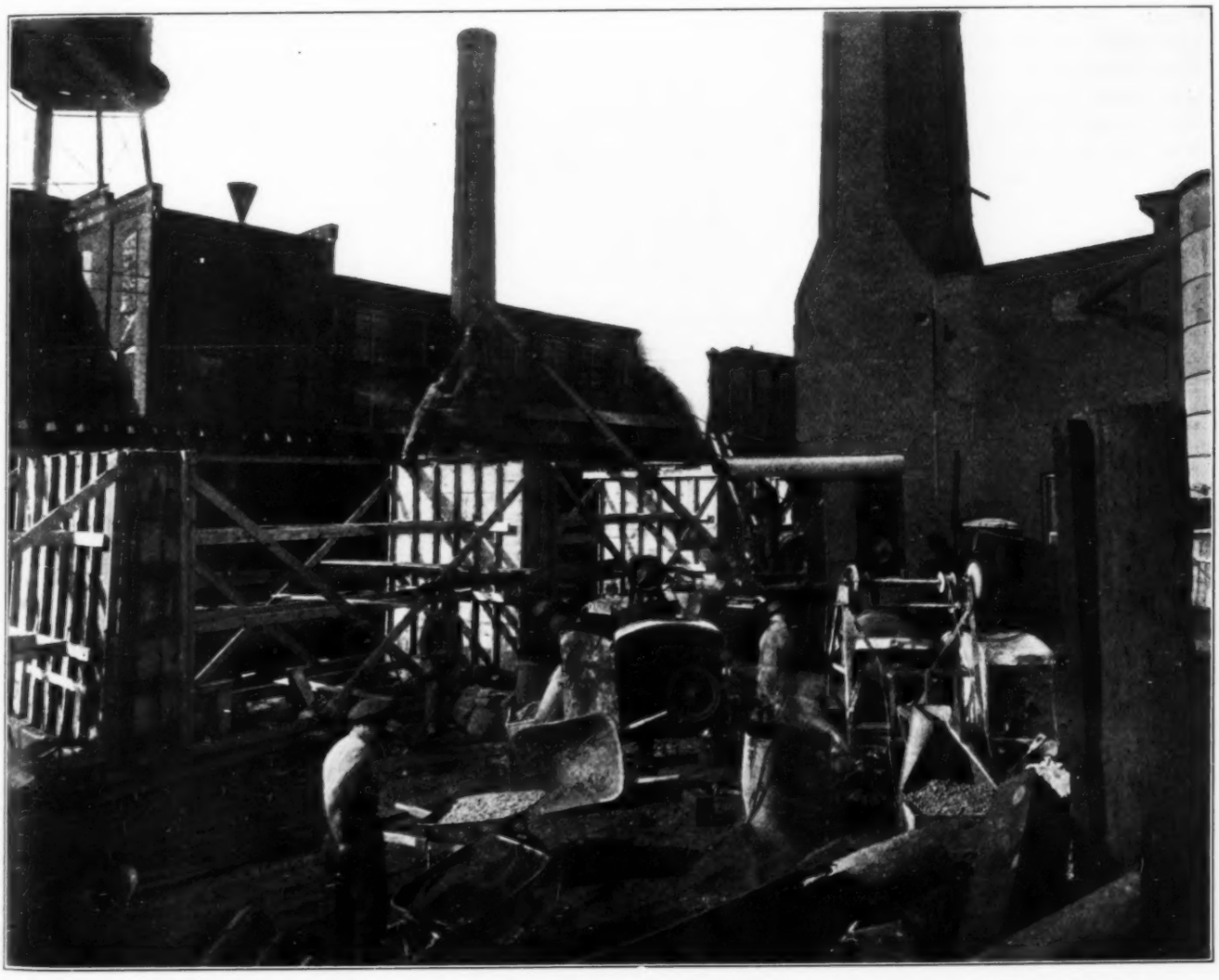
When the project is completed, it will stand not only as a memorial to the Southern Confederacy, whose traditions of heroism are a common American heritage, but as a supreme testimonial of the indissoluble union of the American people.

HANDLING CONCRETE IN A TIGHT CORNER

Crane Equipped with Clamshell Bucket Eliminates Tower and Chute

THE advantage of mobile equipment never was better illustrated than in the photograph at the bottom of this page, where a crane mounted on a motor truck, owned by the Herkner Motor Trucking Company of Cleveland, has tucked itself away in a corner and is supplying concrete to the forms for the piers of an elevated structure.

This job consists of track elevation for the Pennsylvania Railroad in Cleveland, and the use of the crane, which was equipped with a clamshell bucket with the teeth removed, was decided upon in order to obviate the necessity of building a tower and chuting the concrete. The concrete was mixed in the two small mixers shown in the photograph and was then poured into a mortar box. The bucket then picked the mixture out of the mortar box and deposited it in the forms. Very little water was lost in the transfer, although the concrete was fairly wet.



PLACING CONCRETE WITH CLAMSHELL BUCKET HANDLED BY CRANE MOUNTED ON MOTOR TRUCK

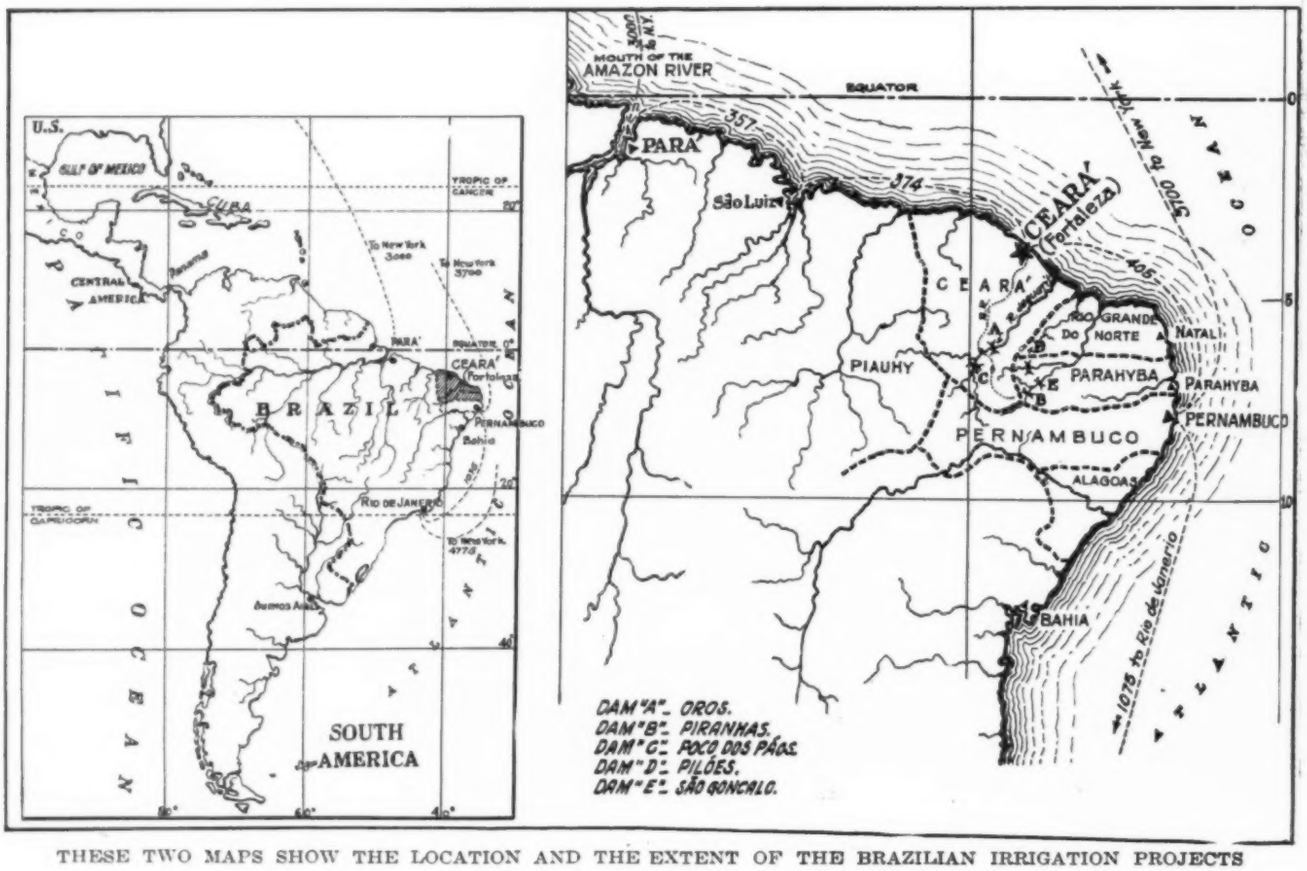
IRRIGATION WORK ON A BIG SCALE

Brazilian Government Is Improving Section on Eastern Coast—Contractors from United States Building Five Dams

BRAZIL has undertaken irrigation work on a large scale in order to reclaim vast areas of land which at present are almost useless for agricultural purposes. The rainfall in other sections is adequate to take care of the drier parts of the country, and the plans of the Brazilian Government include an irrigation system which calls for the conservation of the water of the Jaguaribe River in the State of Ceara, of the upper Piranhas and Peixe Rivers in the State of Parahyba, and of the lower Piranhas and the upper Serido in the State of Rio Grande do Norte. There are in all eleven jobs under way, which are being handled by three companies, two English and one American. The American company is the Dwight P. Robinson Company of New York City.

CENTRIFUGAL PUMP AT PIRANHAS MOUNTED ON TRUCK SO THAT WATER MAY BE OBTAINED AT ANY STAGE OF THE RIVER

One of the big units in this work is the Poco dos Paus Dam, which with the Oros Dam will supply the water which is in the Jaguaribe River basin. This dam will be 1970 ft. long, 214 ft. high at its highest point, and 164 ft. wide at its base. When completed it will contain 785,000 cu. yd. of masonry, making it one of the largest dams in the world. The reservoir behind it will hold about 264 billion gallons, or about two-thirds as much as the Roosevelt reservoir and one-third as much as the Elephant Butte reservoir. Because of the nature of the country in which the work was being done, it was necessary to build and maintain a town in which the workers could live. When the work began in August, 1921, there were only a few adobe huts on the site of the town of Poco dos Paus. At present



THESE TWO MAPS SHOW THE LOCATION AND THE EXTENT OF THE BRAZILIAN IRRIGATION PROJECTS

it is an industrial city. Model homes have been built. A modern filtered water supply has been provided and there is even a plant for the manufacture of ice. A sanitary code has been put in force and everything possible has been done to eradicate the diseases which hitherto have been prevalent in that section of the country.

The photographs accompanying this article show various phases of the work at Poco dos Paus and at

DERRICK AND CLAMSHELL BUCKET IN OPERATION AT SAO GONCALO DAM

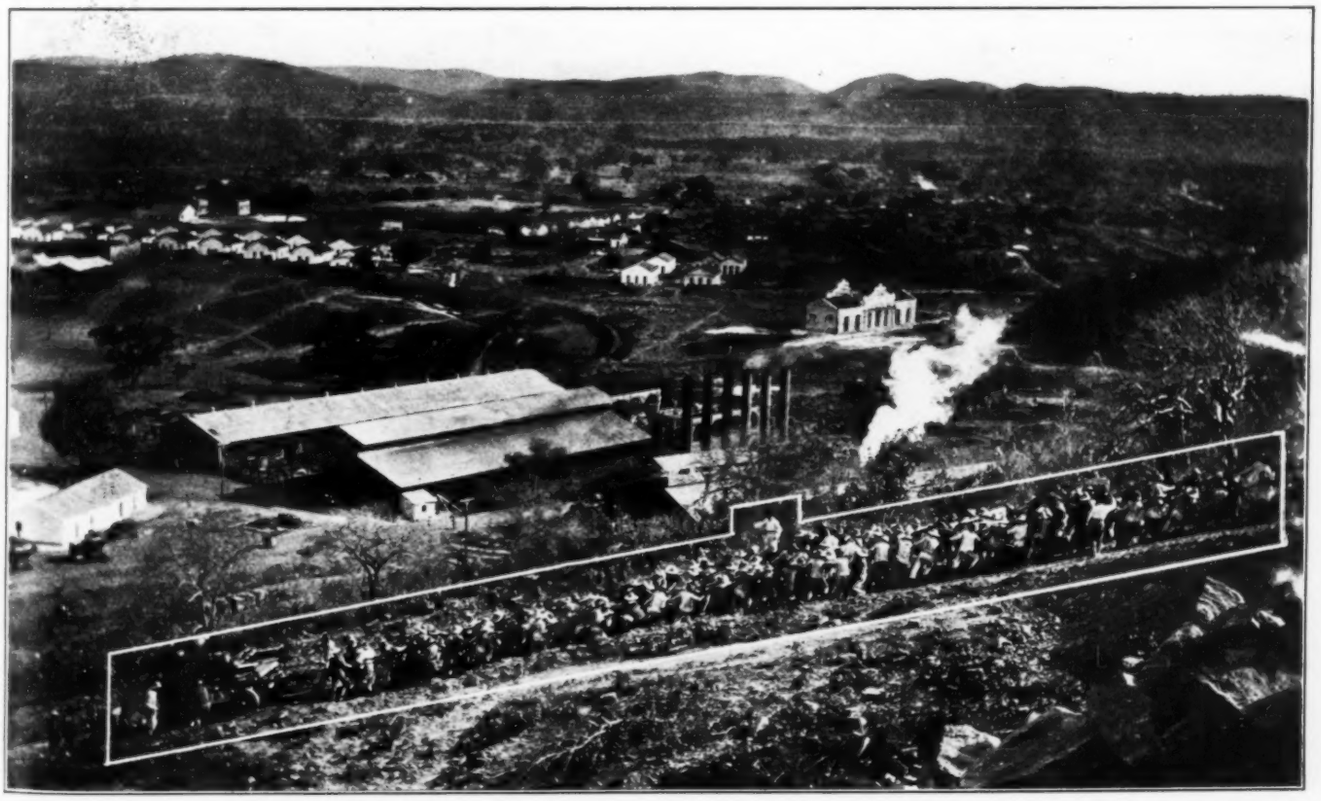
other places where dams are being built by the Dwight P. Robinson Company. They illustrate clearly the character of the country in which this great construction project is being carried on and also show some of the problems and the ways in which they have been solved. The map on page 16 shows the part of Brazil which will be benefited by this improvement. The most striking photograph of all is that

EXCAVATION AT THE SITE OF THE PILOES DAM

at the bottom of this page. Hand labor is not quite so expensive in Brazil as it is in the United States, and this remarkable photograph shows 250 men in line hauling material for one of the head towers up the hillside. Part of the town of Poco dos Paus may be seen in the distance.

All of this work is under the direction of the Federal Department of Works to Prevent Droughts, which in turn is under the Minister of Public Works. Dr. Arrojado M. R. Lisboa, inspector general, is in personal charge of the irrigation development.

As shown on the map when this work has been completed, the extent of the territory that will be put under cultivation will justify the immense sums now being spent. The Brazilian Government is doing for its arid lands exactly what the United States Government has done in the western part of this country.



LIKE A MOVIE MOB SCENE. HAULING MATERIAL FOR HEAD HOUSE UP THE HILLSIDE AT POCO DOS PAUS. THERE ARE 250 MEN ON THE ROPES.

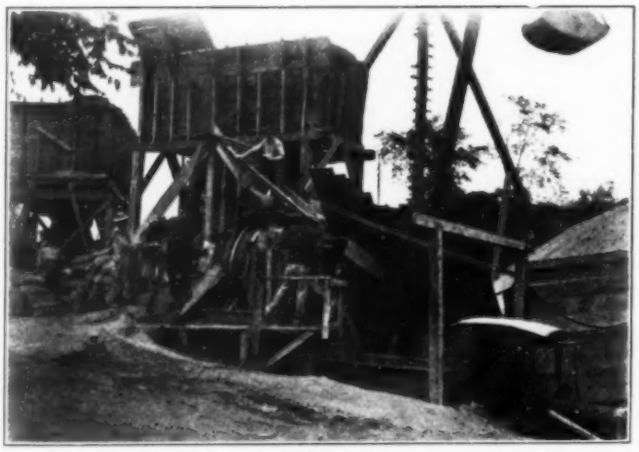
CONVEYOR CUTS STORAGE COSTS

Illinois Contractors Take Care of Surplus Material by Economical Method

THE storage of surplus material at a crushing plant always is a problem. The Wilson A. Jaicks Construction Co. of Batavia, Ill., disposed of their fines for a while with three teams hauling slip scrapers. This method proved expensive and unsatisfactory and it was decided to install a portable conveyor.

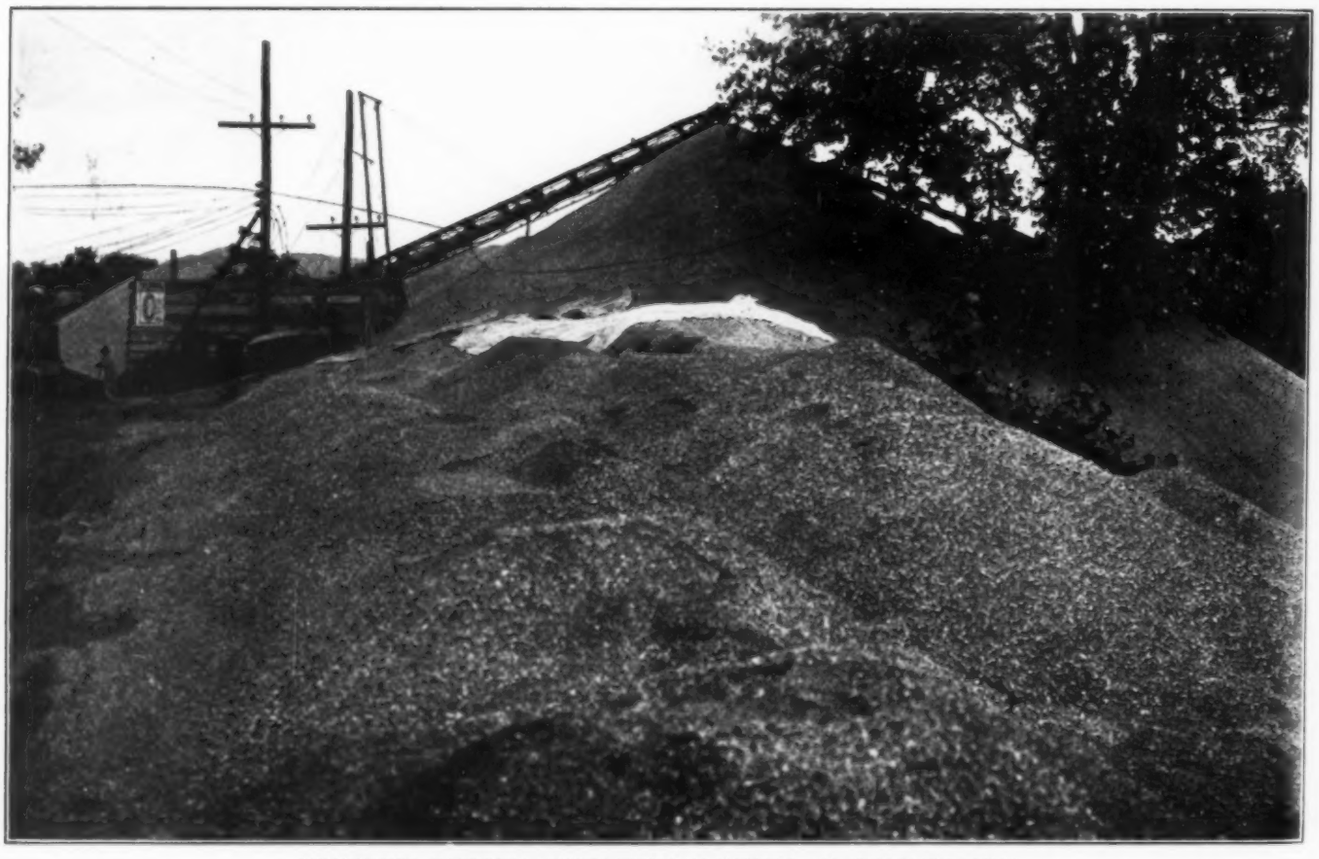
This conveyor, operated by one man, has since been disposing of all the fines at a saving of about $25 per day over the cost by the old method. The photograph at the bottom of this page shows the conveyor at work. It also shows rather indistinctly under the tree at the right of the storage pile a light wooden chute which was used in order to increase the storage capacity of the pile. The fines when delivered by the conveyor fall into the chute and slide down the side of the pile. By the use of a stream of water from a small hose the fines were made to flow at a comparatively flat angle, thus increasing the size of the pile.

This method of storing the fines in a high concentrated pile made it possible to reclaim them quickly and economically. They will be used either for sale in their present condition or will be put through the crusher to produce sand.



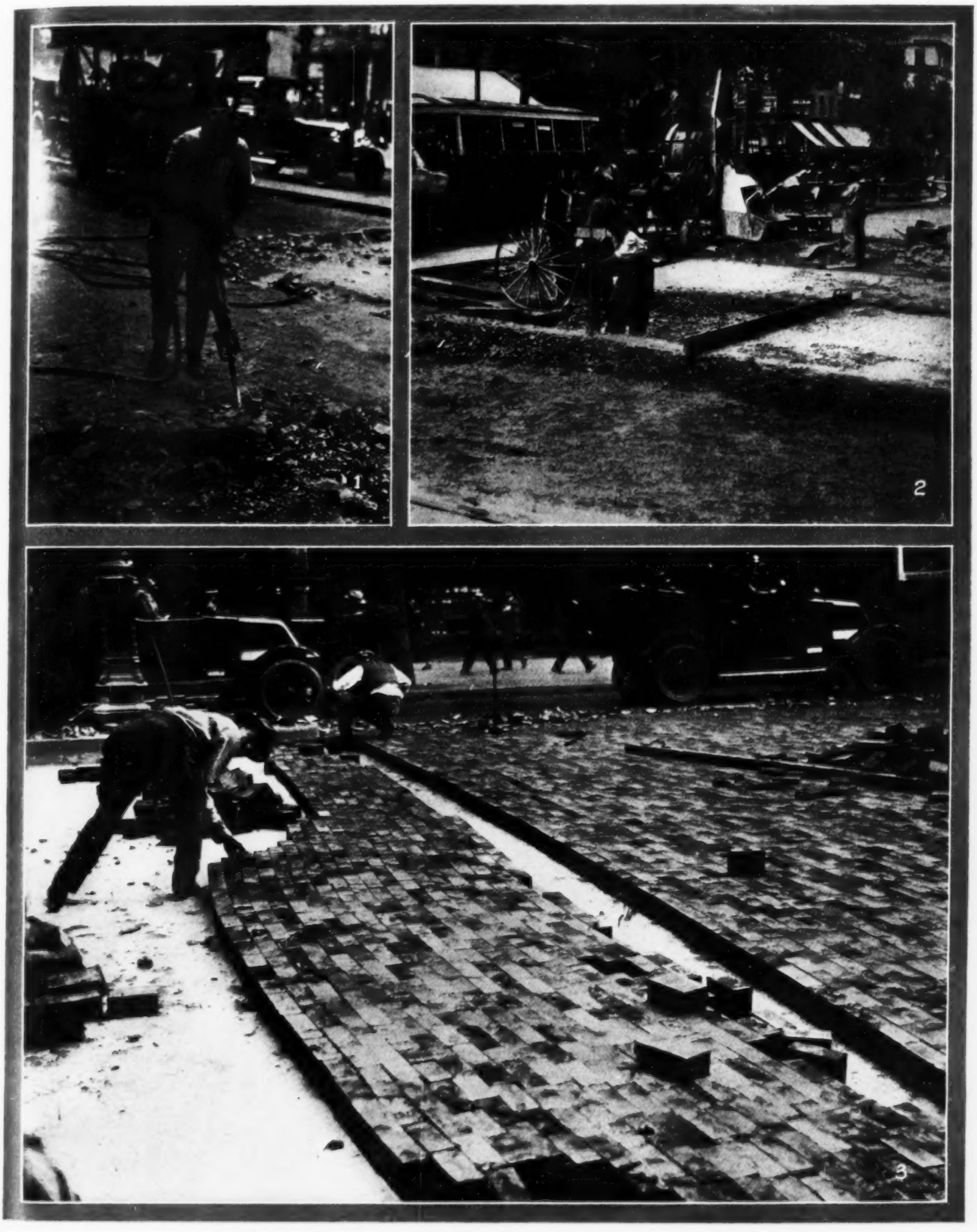
MIXING PLANT WITH PROPORTIONING BINS IN BACKGROUND

The small photograph shows the company's mixing plant with a truck backed under it to receive the wet mix for use on paving work. In addition to supplying material for its own work, the Jaicks Company sold proportioned batches of sand and gravel to the Wells Engineering Company, which also was doing paving work in Batavia. One of the bins in the background of the small photograph was loaded with a crane and clamshell bucket and then supplied proportioned batches to the Wells Company's trucks without interfering with the Jaicks company's equipment.



CONVEYOR CARRIES FINES FROM CRUSHER TO STORAGE PILE

Paving the Paris Boulevards



1—Breaking up an old pavement with a drill operated by compressed air.
2—Making the concrete bed with a small mixer.
3—Laying the blocks which are for the wearing surface. © *International.*

BREAKING UP AN OLD ROAD

Haphazard Methods of Repair Make Sewer Work Difficult. Compressed Air Turns Trick

A PORTABLE outfit for breaking pavement is being used to cut costs and to speed up the work on a sewer job in Woodbridge, N. J. The job includes seven miles of 8 to 18 in. terra cotta pipe laid in trenches from 6 to 17 ft. deep.

Part of the trench has to be dug in a very heavily traveled road, which was until recently the main route from New York to Philadelphia. Before this road was improved mud holes in it evidently were filled with stones, stumps and rubbish. Later it was surfaced with about 6 in. of waterbound macadam. On top of this was finally placed 4 to 6 in. of asphalt macadam, making a total surface of from 10 to 18 in.

This old surfacing has been well maintained for years under heavy traffic. Cutting through it for trench was accordingly a stiff proposition. With the portable compressor outfit showing in one of the photographs, two men and a foreman have averaged about 250 lin. ft. of cut 3 ft. wide in 9 hr.

EXCAVATOR CUTTING SEWER TRENCH

The compressor has a capacity of 70 cu. ft. whereas the two portable pavement breakers used with it are each rated to require 60 cu. ft. per minute. A larger compressor might be better, but by working the two breakers side by side, the power for each is reduced.

With the three-man gang, the foreman spells the two regular men occasionally. The odd man keeps his eye on the compressor and handles traffic when necessary. Working this way avoids having the men overdo and

PREPARING THE WAY WITH PNEUMATIC TOOLS

get the results stated. At times the outfit was breaking through 4 in. of frost under the road surfacing. The contractor then replaced the regular 14 in. moil points with points 18 in. long under the collar. Thus equipped, the breakers opened up as much as 22 in. in depth without requiring any material to be removed.

For a distance of 4450 ft. on this road a connection has to be placed every 25 ft. The breakers are used to cut the pavement. The material, which varies from soil to very stiff clay is then removed with pneumatic spades furnished with power from the compressor. The main trenches are all dug with the trenching machine shown in one of the photographs. This machine for some time averaged about 430 ft. of 10 to 12 ft. trench in 9 hr. in hard digging, where many boulders occurred.

This work is being done by Excavating & Material Handling, Inc., of Perth Amboy, N. J., of which O. W. Hosking is president and engineer.

TO HOLD OPEN AIR ROAD SHOW

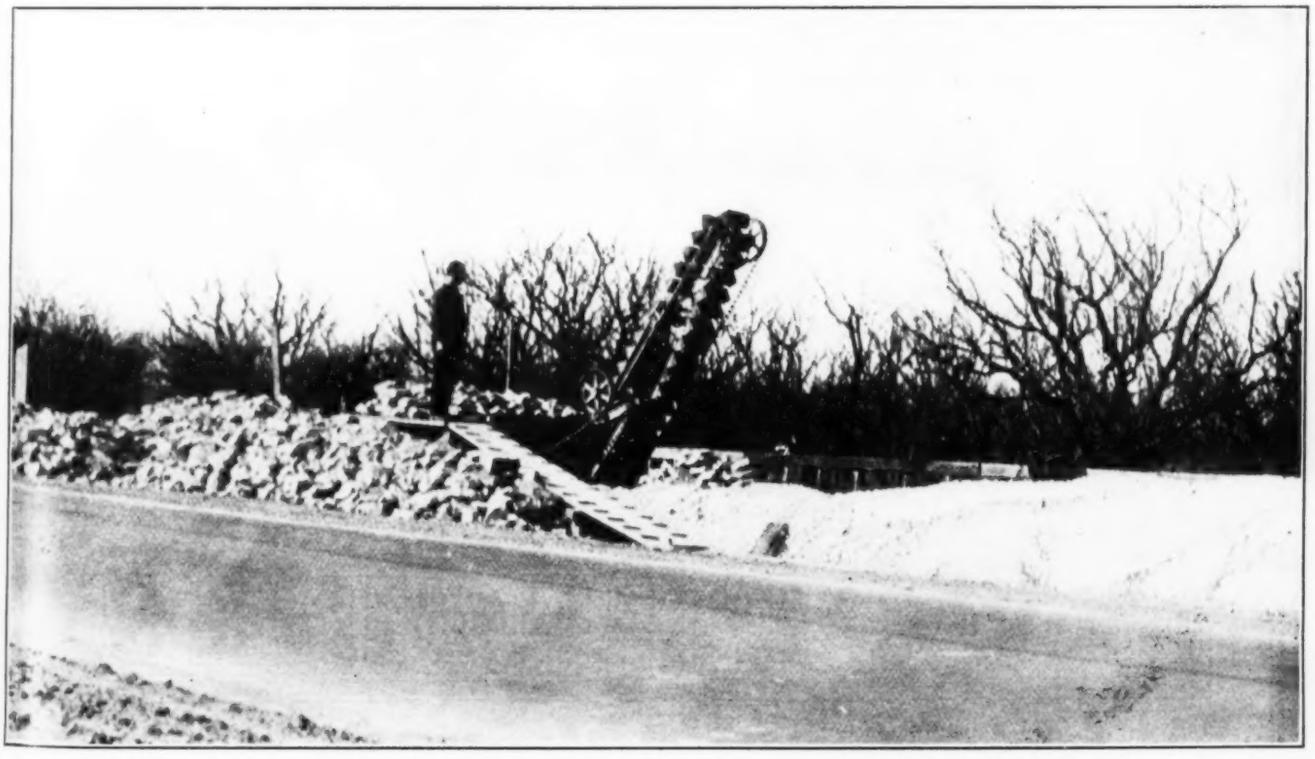
American Road Builders Will Conduct Working Exhibition in North Carolina

THE American Road Builders' Association will hold an open-air exhibition of road building machinery at Greensboro, N. C., on June 4-7. This "shirt sleeve road show," as it has been aptly christened, will take place at the time of the visit of the Pan-American Highway Commission to North Carolina. In addition to the engineers and others identified with highway construction from the South and Central American countries it is expected that engineers from other countries will avail themselves of this opportunity to see how highways are built in the United States.

The shirt sleeve road show will be under the direction of C. M. Upham, business manager of the American Road Builders' Association and State highway engineer of North Carolina. He has selected a number of actual road jobs in the vicinity of Greensboro which will be made units of the show, and in addition there will be a large exhibit of road construction machinery at the Greensboro fair grounds. All local officials, contractors, engineers and others in the Southeast identified with road building and maintenance are invited to attend this show, the first of its kind ever attempted in this country.

PORTABLE CRUSHER HANDLES BROKEN CONCRETE AT ROADSIDE

THE accompanying photograph shows a portable rock crusher at the side of a highway near Santa Clara, Cal., which is used in crushing broken concrete removed from the highway. The crushed concrete is then used again in the reconstruction and repair of the same or other highways, thus effecting a considerable saving. Previously the concrete removed from the highways was likely to be wasted.



THESE CHUNKS OF CONCRETE ARE CRUSHED AND USED OVER AGAIN

"giving entire satisfaction on all the jobs"

There is no better recommendation for an engine than the unbiased testimonial of a user.

FRED T. LEY & CO., INC.
SPRINGFIELD
MASSACHUSETTS

October 30th, 1923

The Associated General Contractors,
1038 Munsey Building,
Washington, D. C.

Gentlemen:

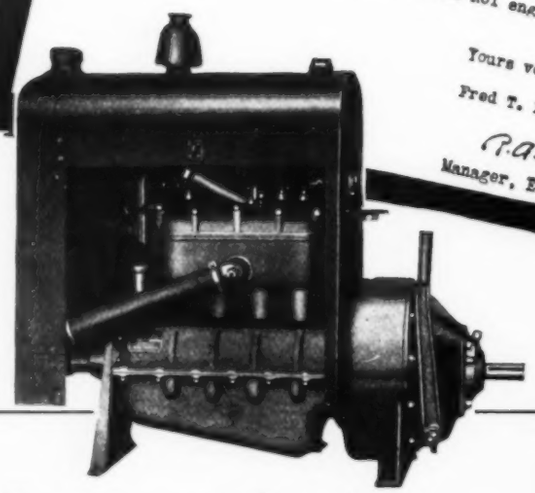
Answering your letter of the 26th, please be advised that we do not keep a detail of the work done on each job by each mixer on which we have Le Roi engines, but we can say that they are giving entire satisfaction on all the jobs.

We have only been using these engines for a little over a year, but feel that we made a good move when we decided to change over to the Le Roi engines.

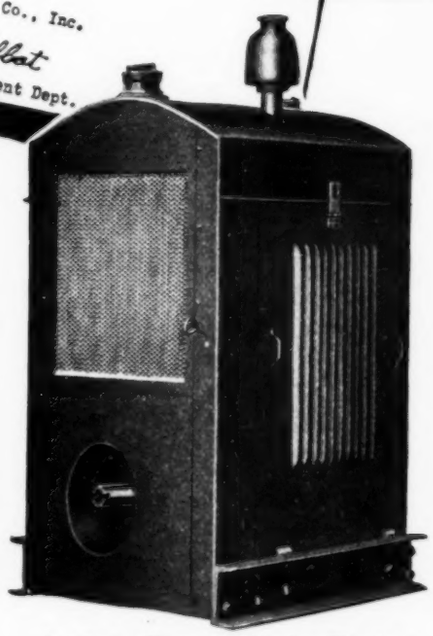
Yours very truly,
Fred T. Ley & Co., Inc.
P. A. Talbot
Manager, Equipment Dept.

NOTE

It is generally conceded that most mixers are underpowered. Every 4S mixer requires a LE ROI 4 H. P. Engine and every 7S mixer requires a LE ROI 8 H. P. Engine for a maximum of results at the lowest cost. If you are not using these engines ask us to prove why it will be to your decided advantage to do so. Use your letterhead, please.



LE ROI 4 Cylinder Engine



LE ROI Two Cylinder Engine

LE ROI Power Service

HOPPER COOLED TYPE — 3 to 4 H. P. Single Cylinder — 5 to 8 H. P. Two Cylinder.

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